LSE PROBABILITY AND STATISTICS FOR ECONOMICS AND ECONOMETRICS

Overview

The course provides a precise and accurate treatment of probability, distribution theory and statistical inference.

As such there will be a strong emphasis on mathematical statistics as important discrete and continuous probability distributions are covered (such as the Binomial, Poisson, Uniform, Exponential and Normal distributions). Properties of these distributions will be investigated including use of the moment generating function.

Point estimation techniques are discussed including method of moments, maximum likelihood and least squares estimation. Statistical hypothesis testing and confidence interval construction follow, along with non-parametric and goodness-of-fit tests and contingency tables. A treatment of linear regression models, featuring the interpretation of computer-generated regression output and implications for prediction, rounds off the course.

Key information

Prerequisites: No previous knowledge of statistics will be assumed, although familiarity with elementary statistics to the level of ME116 would be an advantage (for example, descriptive statistics – sample mean and variance). Mathematics to A-level standard or equivalent is highly desirable, i.e. competency with basic calculus, integration and algebraic manipulation (although a refresher document will be provided).

Assessment: Two written examinations

Outcomes

- To provide a solid understanding of distribution theory which can be drawn upon when developing appropriate statistical tests. Useful properties of some important distributions will be reviewed as well as parameter estimation techniques for various probability distributions
- To facilitate a comprehensive understanding of the main branches of statistical inference, and to develop the ability to formulate the hypothesis of interest, derive the necessary tools to test this hypothesis and interpret the results
- To introduce the fundamental concepts of statistical modelling, with an emphasis on linear regression models with multiple explanatory variables

Key topics

- Probability theory
- Random variables
- Common distributions of random variables
- Multivariate random variables
- Sampling distributions of statistics
- Point estimation
- Interval estimation
- Hypothesis testing
- Analysis of variance (ANOVA)
- Linear regression

Course structure and assessments

- The structure of the course will be a mixture of lectures and classes. Exercises will be discussed in classes as a group.
- The assessment will consist of two exams. The first will be worth 30% of overall mark, the second will be worth 70%.

Reading materials

-
- As stand-alone resources will be provided, there will be no need to rely on a particular text. There are several good texts at the right level for this course which can be used in support of the course materials, including:
- Freedman, D., Pisani, R. and R. Purves (2007) *Statistics*, Norton, 4th edition.
- Larsen, R.J. and M.J. Marx (2017) *An Introduction to Mathematical Statistics and Its Applications*, Pearson Education, 6th edition.